

Science Grade Level Expectations

Missouri Department of Elementary and Secondary Education
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Grades K-3 Expectations

Standard 1: Properties and Principles of Matter and Energy

1. Properties and Structure of Matter				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	<i>Scope & Sequence – Describing with the Five Senses</i> a. Describe physical properties of objects (size, shape, color, and mass) by using the senses, simple tools, and/or non standard measure (magnifiers, simple balance) b. Identify materials (e.g., cloth, paper, wood, rock, metal) that make up an object and some of the properties of the materials (e.g., color, texture, shiny/dull, odor, sound, taste, flexibility) c. Sort objects based on observable properties (e.g., size, material, color, shape, mass)		<i>Scope & Sequence – Matter and Energy</i> a. Describe the physical properties of objects by using simple tools (i.e., thermometer, magnifier, centimeter ruler, balance) b. Classify objects as natural or manmade c. Classify objects as “one kind of substance” or a mixture d. Observe and describe how mixtures are made by combining solids or liquids or a combination of these e. Describe ways to separate the components of a mixture by their properties (sorting, filtration, magnets, or screening)	
ST	SC 1 1.2, 1.6		SC 1 1.2, 1.4	
B. Matter is anything that takes up space, has mass, and exists as solids, liquids or gases		<i>Scope & Sequence – Balancing and Measuring</i> a. Measure the mass of objects using a balance b. Given a balance beam, a fulcrum, and various objects, illustrate arrangements in which the beam is balanced c. Compare the mass of objects d. Order objects according to mass	<i>Scope & Sequence – Matter and Energy</i> a. Classify everyday objects/substances as solid, liquid or gas (air) b. Compare the observable properties of water as a solid, liquid, or gas (air) (i.e., visible vs. non-visible, changes in shape, changes in amount of space taken up) c. Identify that water exists as a solid or liquid or invisible gas	
ST		SC 1 1.2, 1.6	SC 1 1.2, 1.8	
C. Objects and materials can change			<i>Scope & Sequence – Matter and Energy</i> a. Investigate and relate how water can freeze into a solid and then melt into a liquid again b. Measure and compare the temperature of water when it exists as a solid with its temperature when it exists as a liquid c. Predict the changes in the properties of objects when heated or cooled (melting, freezing)	
ST			SC 1 1.2, 3.5	

Standard 1: Properties and Principles of Matter and Energy *(continued)*

2. Forms and Sources of Energy				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. Forms of energy (sound and heat) have a source, a means of transfer and a receiver	<i>Scope & Sequence - Sounds</i> a. Identify the sounds and their source of vibrations in our everyday life (e.g., alarms, car horns, animals, weather, machines, musical instruments) b. Identify the means of energy transfer (e.g., human blowing into or striking objects) when sounds are produced using objects (e.g., bells, whistles, glasses containing water) c. Compare the different sounds (loudness, pitch, rhythm) that can be produced using objects (e.g., bells, whistles, glasses containing water) d. Recognize that the ear serves as a detector of sound	<i>Scope & Sequence – Observing Weather/Heat (SC5)</i> a. Identify the source of energy that causes an increase in the temperature of an object (e.g., Sun, stove, flame, light bulb) b. Compare the temperature of how hot or cold an object is using a simple thermometer c. Describe the change in temperature of an object as hotter or cooler d. Compare the differences in temperature over time on different colored (black and white) objects placed under a heat source	<i>Scope & Sequence – Matter and Energy</i> a. List sources of heat that can change solids to liquids (sun, stove, fire, body)	<i>Scope & Sequence – Forms of Energy: Sound</i> a. Identify the sources of vibrations (blowing, plucking, tapping) b. Describe different ways to change pitch (length, thickness, tension) c. Compare how sound travels through different materials (air, water, solids) d. Describe how the ear serves as a detector of sound
ST	SC 1 1.2, 2.1	SC 1 1.2, 4.1	SC 1 1.2, 1.6	SC 1 1.2, 3.5
B. Energy from the sun (solar radiation) is a major source of energy on Earth		<i>Scope & Sequence – Observing Weather/Heat (SC5)</i> a. Identify the Sun as the primary source of heat and light energy on Earth <i>Scope & Sequence – Plant and Animal Characteristics</i> b. Identify energy from the Sun as a basic need of most plants	<i>Scope & Sequence – Matter and Energy</i> a. Predict and investigate the effect of sunlight on objects (e.g., change in temperature, melting)	<i>Scope & Sequence – Interactions & Interdependence of Organisms</i> a. Sequence the flow of energy through a food chain beginning with the Sun
ST	SC 1 1.2, 2.1	SC 1 1.2, 4.1	SC 1 1.2, 1.6	SC 1 1.2, 3.5
C. Energy can change forms			<i>Scope & Sequence – Matter and Energy</i> a. Identify examples of changes in forms of energy (e.g., light produces heat, rubbing objects together - mechanical energy - produces heat and sound, burning wood produces heat and light)	
ST			SC 1 1.2, 1.6	

Standard 2: Properties and Principles of Force and Motion

1. Relative Motion				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. The position and motion of an object can be described by locating it relative to another object	<i>Scope & Sequence – Relative Position</i> a. Describe an object’s position relative to another object (above, below, in front of, behind)	<i>Scope & Sequence – Describing Motion</i> a. Compare the speeds (faster vs. slower) of two moving objects b. Compare the position of an object relative to another object (left of or right of) c. Describe an object’s motion as straight, circular or zigzag		
ST	SC 2 1.6	SC 2 1.6		
B. The way to change the position or motion of an object is to give it a push or pull (force)		<i>Scope & Sequence – Describing Motion</i> a. Identify the force (push or pull) required to perform a task b. Describe ways to change the motion of an object including how to cause an object to go slower, go faster, go farther, change direction, or stop		
ST		SC 2 1.6	SC 2 3.6	
2. Interactions of Forces and Motion				
A. A relationship exists between the strength of a force and its effect on the motion of an object			<i>Scope & Sequence – Investigating Forces</i> a. Compare the distance traveled by objects with different masses while applying the same force b. Compare the distance traveled by objects with the same mass while applying different amounts of force	<i>Scope & Sequence – Forms of Energy: Sound</i> a. Describe how force affects loudness
ST			SC 2 1.4	
B. Forces act by making contact with an object (friction) or without touching an object (gravity, magnetism)	<i>Scope & Sequence – Magnets</i> a. Show that a magnet can be used to make some things move without being touched b. Identify the kinds of materials that are attracted to a magnet		<i>Scope & Sequence – Investigating Forces</i> a. Describe how magnets attract and repel each other and certain metals b. Describe magnetism as a force that can push or pull other objects without touching them c. Describe gravity as a force that pulls objects toward one another without touching them d. Describe friction as a force that slows down or stops a moving object that is touching another object (or surface) e. Measure (using nonstandard units) and compare the force required to overcome friction and move an object over different surfaces	

Standard 2: Properties and Principles of Force and Motion *(continued)*

2. Interactions of Forces and Motion <i>(continued)</i>				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
C. Inclined Planes (ramps) and levers affect the force required to raise an object			<i>Scope & Sequence – Investigating Forces</i> a. Compare the amount of force needed to raise an object to a given height with or without using inclined planes (ramps) of different slopes b. Compare the amount of force needed to raise an object to a given height with or without using levers c. Apply the use of an inclined plane (ramp) and/or lever to different real life situations in which objects are being raised	
ST			SC 2 3.1	

Standard 3: Characteristics and Interactions of Living Organisms

1. Characteristics of Organisms				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. Plants and animals are living and have characteristics and basic needs that make them different from non-living matter		<i>Scope & Sequence – Plant and Animal Characteristics</i> a. Sort living and non-living things in to groups b. Identify the basic needs of most animals (air, water, food, and shelter) c. Identify the basic needs of most plants (air, water, light, nutrients, and temperature) d. Predict and investigate the effects of removing one of the needs of a plant on its growth (e.g., dark vs. light, water vs. no water)		
ST	SC 3 1.3, 1.6	SC 3 1.6, 2.3		
B. Living organisms have observable characteristics	<i>Scope & Sequence – Plant and Animal Behaviors</i> a. Use the five senses to gather information about the structures and behaviors of plants and animals <i>Scope & Sequence – Observing with our Five Senses</i> b. Identify each sense (smell, taste, touch, sight, hearing) and the human organ used to gather information (nose, tongue, skin, eyes, ears). c. Explain how each sense is used to gather information	<i>Scope & Sequence – Plant and Animal Characteristics</i> a. Compare plants based on physical characteristics (e.g., stem, leaves, flowers, seeds.) b. Compare animals based on their physical characteristics (e.g. appendages, skin covering, eyes, beaks) c. Classify plants and animals into groups based on similar observable characteristics		
ST		SC 3 1.6		
2. Structure and Function of Living Systems				
A. Each plant or animal has different structures that serve different functions in growth, survival, and reproduction		<i>Scope & Sequence – Plant and Animal Characteristics</i> a. Identify relationships between the physical structures of plants and animals and the function of those structures (e.g., animals have distinct body structures for walking, holding, observing,, communicating; plants have structures for absorption of water, support, absorbing light energy, reproduction)		
ST		SC 3 1.6		

Standard 3: Characteristics and Interactions of Living Organisms *(continued)*

3. Reproduction and Heredity				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. Organisms (plants and animals) go through life cycles			<i>Scope & Sequence – Life Cycles of Plants and Animals</i> a. Record observations on the life cycle of different organisms (e.g., butterfly, frog, chicken, flowering plant) b. Sequence the stages in the life cycle of a particular organism (i.e., butterfly, frog, flowering plant)	
ST			SC 3 1.3, 1.6	
B. Most offspring are similar but not exactly like their parents	<i>Scope & Sequence – Plant and Animal Behaviors</i> a. Recognize a parent – offspring relationship based on their physical similarities and differences		<i>Scope & Sequence – Life Cycles of Plants and Animals</i> a. Identify and relate the similarities and differences between parents and their offspring	
ST				
4. Change Over Time				
A. Fossils provide evidence that organisms that lived in the past were both similar to and different from organisms present today			<i>Scope & Sequence – Earth Materials: Rocks & Soils</i> a. Identify fossils as evidence that organisms once lived in the past b. Observe and compare common fossils of Missouri to organisms that are present today	
ST				

Standard 4: Changes in Ecosystems and Interactions of Organisms with Their Environments

1. Populations and Ecosystems				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. All living organisms interact with each other and their environment in order to live and grow		<i>Scope & Sequence – Plant and Animal Characteristics</i> a. Identify ways man depends on living organisms for food, clothing, and shelter b. Observe and identify ways that organisms depend on other organisms for survival (e.g., plants provide food and shelter for other organisms, animal parents care for young, animals eat other animals or plants, bees pollinate flowers)		<i>Scope & Sequence – Interactions & Interdependence of Organisms</i> a. Identify the ways a specific organism may interact with other organisms or with the environment (e.g., mimicry, pollination, shelter, seed dispersal, camouflage, defensive mechanisms) b. Match and explain specific examples of producer/consumer and predator/prey relationships
ST				SC 4 1.1, 1.3, 1.6
B. Organisms exhibit behaviors that allow them to deal with changes in their environment				<i>Scope & Sequence – Interactions & Interdependence of Organisms</i> a. Describe changes in animal behaviors and reactions to seasonal changes (e.g., hibernation, migration) b. Identify examples in Missouri where human activity has had a beneficial or harmful effect on organisms
ST				SC 4 1.6
2. Diversity and Adaptation				
A. Plants and animals have specialized structures that help them survive in their environment				<i>Scope & Sequence – Interactions & Interdependence of Organisms</i> a. Identify specialized structures and describe how they help plants survive in their environment (e.g., roots, cactus needles, thorns, winged seeds, waxy leaves) b. Identify specialized structures and senses and describe how they help animals survive in their environment (e.g. antennae, body covering, teeth, beaks, whiskers, appendages) c. Predict which plant or animal will be able to survive in their environment based on its special structures or behaviors
ST				SC 4 1.5, 1.6

Standard 5: Process and Interactions of the Earth's Systems

1. Geosphere				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. The Earth's crust is composed of various materials including soil and rocks			<i>Scope & Sequence – Earth Materials: Rocks & Soils</i> a. Identify, compare, and record the physical properties (odor, appearance, grain size, texture and absorption of water) and components (sand, clay and humus) of soils b. Identify, compare, and record the physical properties of rocks (e.g., size, shape, color, presence of fossils)	
ST			SC 5 1.6	
B. The Earth's materials are formed through a variety of processes			<i>Scope & Sequence – Earth Materials: Rocks & Soils</i> a. Observe and describe the breakdown of plant and animal material into soil through decomposition processes (i.e., decay/rotting, composting, digestion) b. Describe how Earth's surface materials (rock, soil layers) change slowly over time by freezing, thawing, or wearing away (do not assess terms weathering or erosion) c. Describe how Earth's surface materials change quickly over time by earthquakes, floods, rock/mud slides, or volcanic activity	
ST				
2. Atmosphere and Weather				
A. Weather can be described by measurable properties	<i>Scope & Sequence – Observing the Changes in Seasons</i> a. Observe and describe daily weather: precipitation (snow, rain, sleet, fog), wind, cloud cover, and temperature	<i>Scope & Sequence – Observing Weather/Heat</i> a. Observe, measure and record weather using thermometers, rain gauges and weather vanes b. Observe and record cloud cover, precipitation, wind and temperature c. Summarize and recognize patterns over time in the weather data collected d. Summarize and recognize relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and precipitation)		
ST	SC 5 1.3, 1.6	SC 5 1.8		

Standard 5: Process and Interactions of the Earth’s Systems *(continued)*

3. Hydrosphere: Water – Water Cycle				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. The ability of water to change forms as it moves through a system is called the water cycle				<i>Scope & Sequence – Properties of Water/ Water Cycle</i> a. Investigate and relate how water can evaporate into a gas and then condense into a liquid again b. Illustrate and relate the phase changes of water as they occur in the water cycle
ST				SC 5 3.1
B. Water is an essential natural resource				<i>Scope & Sequence – Properties of Water/ Water Cycle</i> a. Recognize the importance of water to living organisms b. Identify natural sources of water on Earth (e.g., rivers, oceans, ponds, ice, underground sources) c. Explain why fresh water is a limited resource d. Identify ways that water can be polluted naturally or by humans
ST				SC 5 4.1
C. The water cycle has a major role in determining the weather				<i>Scope & Sequence – Properties of Water/ Water Cycle</i> a. Relate the water cycle to changes in the weather (e.g., temperature, wind direction and speed, and all forms of precipitation)
ST				

Standard 6: Composition and Structure of the Universe and the Motion of the Objects Within It

1. Composition and Structure of the Universe				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
A. The earth, sun, and moon are part of a larger system that includes other planets and objects.	<i>Scope & Sequence – Observing the Changes in Seasons</i> a. Observe the presence of the sun, moon and stars in the sky			<i>Scope & Sequence – Observing Patterns of the Sun, Moon and Shadows</i> a. Describe physical features of the planet Earth that allows life to exist and compare these to the physical features of the Sun, moon, stars, and other planets observed using space exploration technology (e.g., telescopes, satellites) b. Recognize that there are more stars in the sky than anyone can easily count, but they are not scattered evenly and they vary in brightness c. Describe our Sun as a star that provides energy to the solar system
ST				
2. Motions of the Universe				
A. The positions of the Sun and Moon as seen from Earth change in observable patterns	<i>Scope & Sequence – Observing the Changes in Seasons</i> a. Describe the Sun as only being seen in the daytime, but the Moon as being seen sometimes at night and sometimes during the day			<i>Scope & Sequence – Observing Patterns of the Sun, Moon and Shadows</i> a. Illustrate and describe how the Sun appears to move slowly across the sky from East to West during a day b. Recognize that the Earth rotates every 24 hours producing the night-and-day cycle
ST				SC 6 1.6

Standard 6: Composition and Structure of the Universe and the Motion of the Objects Within It

(continued)

2. Motions of the Universe (continued)				
Concept	Kindergarten	Grade 1	Grade 2	Grade 3
<p>C.</p> <p>The appearance of the Moon that can be seen from Earth changes in an observable pattern</p>				<p><i>Scope & Sequence – Observing Patterns of the Sun, Moon and Shadows</i></p> <p>a. Observe and chart the appearance of the Moon over time and describe the changes in its appearance (Do not assess names of specific moon phases)</p>
ST				SC 6 1.6
<p>D.</p> <p>The change in the Sun’s position relative to the Earth causes shadows to change</p>				<p><i>Scope & Sequence – Observing Patterns of the Sun, Moon and Shadows</i></p> <p>a. List and order the three things necessary to produce a shadow (light source, object, and surface)</p> <p>b. Chart and describe the changes in length and position (direction) of shadows from morning to midday to afternoon in the sky</p> <p>c. Describe the relationship between the length and position of shadows to the Sun’s position in the sky</p>
ST				SC 6 1.6, 1.4, 3.5
<p>E.</p> <p>Seasons can be observed as a change in weather over the course of a year</p>	<p><i>Scope & Sequence – Observing the Changes in Seasons</i></p> <p>a. Observe and describe the characteristics of the four seasons</p> <p>b. Describe how the seasons affect the behavior of plants and animals</p> <p>c. Describe how the seasons affect the everyday life of humans</p>			
ST	SC 6 1.6			

Standard 7: Processes of Scientific Inquiry

Concept	Kindergarten	Grade 1	Grade 2	Grade 3
1. Scientific Inquiry				
A. Scientific inquiry includes the ability of students to develop and test scientifically oriented questions	a. Raise questions about objects, materials, organisms and events in the environment b. Conduct a simple investigation to answer questions	a. Raise questions about objects, materials, organisms and events in the environment b. Plan and conduct a simple investigation to answer questions	a. Raise questions about objects, materials, organisms and events in the environment b. Plan and conduct a simple investigation to answer questions	a. Raise questions about objects, materials, organisms and events in the environment b. Plan and conduct a simple investigation to answer questions
ST	SC 7 1.1, 1.2	SC 7 1.1, 1.2	SC 7 1.1, 1.2	SC 7 1.1, 1.2
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	a. Observe using the five senses b. Observe using simple tools and equipment (hand lenses, magnets, balances, thermometers) c. Measure length and mass using non-standard units d. Compare amounts	a. Observe using the five senses b. Observe using simple tools and equipment (hand lenses, magnets, balances, thermometers) c. Measure length and mass using non-standard units d. Compare amounts	a. Observe using the five senses b. Observe using simple tools and equipment (e.g., hand lenses, magnets, balances, thermometers) c. Measure length, mass, and temperature using standard and non-standard units d. Compare amounts e. Judge whether measurements are reasonable	a. Observe using the five senses b. Observe using simple tools and equipment (e.g., hand lenses, magnets, thermometers, metric rulers, balances) c. Measure length to the nearest centimeter d. Measure mass using grams e. Measure temperature using degrees Celsius f. Compare amounts g. Judge whether measurements and computation of quantities are reasonable
ST	SC 7 1.4	SC 7 1.4	SC 7 1.4, 1.7	SC 7 1.4, 1.7
C. Evidence is used to formulate explanations	a. Use observations to construct reasonable explanations b. Use observations to describe relationships and make predictions	a. Use observations to construct reasonable explanations b. Use observations to describe relationships and make predictions	a. Use quantitative and qualitative data to construct reasonable explanations b. Use data to describe relationships and make predictions	a. Use quantitative and qualitative data to construct reasonable explanations b. Use data to describe relationships and make predictions
ST	SC 7 1.6	SC 7 1.6	SC 7 1.6, 1.8	SC 7 1.6, 1.8
D. Scientific inquiry includes evaluation of explanations in light of scientific principles (understandings)	a. Compare explanations with prior knowledge	a. Compare explanations with prior knowledge	a. Evaluate the reasonableness of an explanation b. Analyze whether evidence supports proposed explanations	a. Evaluate the reasonableness of an explanation b. Make predictions supported by scientific knowledge c. Analyze whether evidence supports proposed explanations
ST	SC 7 1.7	SC 7 1.7	SC 7 1.7	SC 7 1.7
E. The nature of science relies upon communication of results and justification of explanations	a. Communicate observations using words, pictures, and numbers	a. Communicate observations using words, pictures, and numbers	a. Communicate simple procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs (bar, pictographs) ⇒ writings	a. Communicate simple procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs (bar, pictographs) ⇒ writings b. Interpret data presented in writings, tables, graphs, and drawings
ST	SC 7 2.1	SC 7 2.1	SC 7 1.8, 2.1	SC 7 1.8, 2.1

Refer to DESE materials that articulate standards for data recording and template for experimental design

Standard 8: Impact of Science, Technology and Human Activity

1. The Nature of Technology	
Concept	Grades Kindergarten, 1, 2, 3
A. Tools are used to do things better or more easily and to do some things that could not otherwise be done at all. In technology, tools are used to observe, measure, make things and solve problems.	a. Design and construct a tool using cardboard, wood, plastic, metal, or existing objects that can be used to perform a task (ASSESS LOCALLY) b. Propose ways to solve simple environmental problems (e.g., recycling, composting, ways to conserve natural resources) c. Describe how tools have helped scientists make better observations, measurements, or equipment for investigations (e.g., telescopes, magnifiers, balances, microscopes, computers, stethoscopes, thermometers) d. Recognize that some objects occur in nature (natural objects); others have been designed and made by people to solve human problems and enhance the quality of life (manmade objects) e. Identify how sometimes the effects of inventions or technological advances (e.g., horse-drawn plow vs. tractor, cloth diapers vs. disposable diapers, hand-beater vs. electric mixer, clothesline vs. clothes dryer, land phone vs. cell phone) can be helpful and sometimes they are harmful
ST	
2. Historical Perspective	
	Not assessed at this grade level
ST	
3. Science as a Human Endeavor	
A. Science is a way to solve problems. Everyone can do scientific activities, make discoveries about nature, and invent things and ideas.	a. Identify a question that was asked or could be asked or a problem that needed to be solved when given a brief scenario (fiction or nonfiction stories of individuals solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (ASSESS LOCALLY)
ST	

Grades 4-7 Expectations

Standard 1: Properties and Principles of Matter and Energy

1. Properties and Structure of Matter				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Matter is anything that takes up space and has mass and exists in different states.	<i>Scope & Sequence – Observing Properties of Matter</i> a. Compare the amount of space objects take up (volumes) using a graduated cylinder b. Compare the masses of samples of matter using a balance	<i>Scope & Sequence – Buoyancy</i> a. Identify the effect of mass on the buoyancy of a given volume of matter b. Identify the effect of volume on the buoyancy of a given mass of matter	<i>Scope & Sequence – Properties and Changes of Matter</i> a. Compare the volumes of samples of matter to the nearest milliliter using a graduated cylinder b. Compare the masses of samples of matter to the nearest gram using a balance	
ST			SC 1 1.2, 1.4	
B. Matter is made up of moving particles too small to be seen (atoms, molecules, and subatomic particles)		<i>Scope & Sequence – Water Cycle and Weather (SC 5)</i> a. Explain how evaporation and condensation provide evidence that matter is made up of molecules too small to be seen	<i>Scope & Sequence – Properties and Changes of Matter</i> a. Classify matter as a pure substance made up of one kind of atom (element) or a combination of atoms (compounds) that are too small to be seen	
ST	SC 1 1.8	SC 1 1.6		
C. Matter exists as pure substances or mixtures of substances that have specific physical and chemical properties	<i>Scope & Sequence – Observing Properties of Matter</i> a. Identify the components and properties of different solutions (e.g., salt water, oil and vinegar, pond water, Kool-Aid) b. Observe and describe how mixtures are made by combining solids or liquids or a combination of these c. Record how various soluble and/or insoluble solids behave when mixed with water d. Describe ways to separate mixtures (sorting, evaporation, filtration, magnets, or screening) <i>Scope & Sequence – Earth Materials and External Processes</i> e. Identify water as a solvent that dissolves minerals and gases and carries them to the oceans		<i>Scope & Sequence – Properties and Changes of Matter</i> a. Recognize that matter exists as more than 100 known elements that can be combined in Nature or by man to produce compounds that make up the living and nonliving substances in the environment b. Use appropriate tools (magnet, voltmeter, graduated cylinder, balance, thermometer) to describe a pure substance according to its properties (magnetic, conductivity, melting point and boiling point)	
ST			SC 1 1.2, 1.4	

Standard 1: Properties and Principles of Matter and Energy (continued)

1. Properties and Structure of Matter (continued)				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
D. Matter can change physically and chemically	<i>Scope & Sequence – Earth Materials and External Processes</i> a. Identify physical changes to Earth’s surface materials and features due to weathering and erosion	<i>Scope & Sequence – Water Cycle and Weather (SC 5)</i> a. Identify and describe the effect of heat on the physical properties of water as it changes from solid to liquid to gas (freezing, melting, evaporation, condensation)	<i>Scope & Sequence - Properties and Changes of Matter</i> a. Identify chemical changes (i.e., rusting, burning, decomposition by acids, decaying, baking) in common objects (i.e., rocks, minerals, wood, steel wool, plants) as a result of interactions with energy or other matter that form new substances (compounds) with different characteristic properties b. Identify physical changes in common objects (e.g., rocks, minerals, wood, water, steel wool, antacids, plants) and describe the processes which caused the change (e.g., weathering, erosion, cutting, dye, dissolving) c. Recognize and classify changes in matter as chemical or physical	<i>Scope & Sequence – Structure and Function of Life</i> a. Identify the process of photosynthesis as a chemical change with reactants (water and carbon dioxide) and products (energy-rich sugar molecules and oxygen) that takes place in the chloroplasts in the presence of light b. Describe how cells break down sugar (in the presence of oxygen) to release chemical energy, producing by-products (water, carbon dioxide, and energy) (do not assess the term cellular respiration) <i>Scope & Sequence – Structure and Function of Life</i> c. Identify chemical and physical changes that occur in the human body systems
ST			SC 1 1.6	
E. Matter is conserved during any physical or chemical change		<i>Scope & Sequence – Water Cycle and Weather (SC 5)</i> a. Demonstrate and provide evidence that matter is conserved in the water cycle	<i>Scope & Sequence – Properties and Changes of Matter</i> a. Demonstrate and explain how chemical changes provide evidence that matter is conserved during a chemical change in a closed system (e.g., vinegar + baking soda, mold growing in a closed container, steel wool rusting) b. Demonstrate and provide evidence that matter is conserved during a physical change	
ST	SC 1 1.8	SC 1 1.6		

Standard 1: Properties and Principles of Matter and Energy (continued)

2. Forms and Sources of Energy				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Forms of energy (electricity, heat, light, and mechanical) have a source, a means of transfer and a receiver	<i>Scope & Sequence – Forms of Energy: Electricity</i> a. Predict the effects of an electrostatic force (static electricity) on objects (attract and repel) b. Construct and diagram a complete electric circuit by using a source (battery), a means of transfer (wires) and a receiver (resistance bulbs, motors, fans) c. Recognize that electrical energy can only be transferred through a complete circuit (i.e., series and parallel circuits) d. Explain that closed or open circuits are the result of a flow or break in the flow of energy e. Classify different materials (e.g., wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water) as conductors or insulators of electricity	<i>Scope & Sequence – Forms of Energy: Heat</i> a. Recognize that heat flows from warmer objects to cooler objects until both reach the same temperature b. Describe how heat is transferred by conduction, convection and radiation and classify examples of each c. Compare the heat conductivity of common materials (e.g., wood, foam, plastic, air, glass, aluminum foil, soil, water) d. Classify common materials (e.g., wood, foam, plastic, glass, aluminum foil, soil, air, water) as conductors or insulators of heat energy <i>Scope & Sequence – Water Cycle and Weather (SC 5)</i> e. Observe and describe the effect of surface temperature on the temperature and movement of the air above f. Describe the effect of differences in heating and cooling of land and water on weather patterns	<i>Scope & Sequence – Forms of Energy: Light</i> a. Identify producers of visible light (e.g. the Sun and other stars, flint, bulb, flames, lightning) b. Illustrate that visible light travels in a straight line using the appropriate tools (pinhole viewer, ray box and/or laser pointer) c. Compare the reflection of visible light by various surfaces (i.e. mirror, smooth and rough surfaces, shiny and dull surfaces, moon) d. Compare the refraction of visible light passing through different transparent and translucent materials (e.g., prisms, water, a lens) e. Predict how visible light behaves (reflects, refracts, diffracts, absorbs, transmits) when it interacts with different surfaces (transparent, translucent, opaque) f. Illustrate and explain that white light is a mixture of varying wavelengths of energy that are visible to the human eye as different colors of light (using a prism, water droplet, diffraction grating) g. Identify receivers of visible light energy (e.g., eye, motion detector) h. Recognize that a object is “seen” only when the light waves are emitted or reflected by it enter the eye <i>Scope & Sequence – Earth Materials and Internal Processes</i> i. Describe how the energy of an earthquake travels as (seismic) waves	<i>Scope and Sequence – Energy Transfer and Transformations</i> a. Describe mechanical energy as the total kinetic energy (energy of motion) and potential energy (energy of position or condition) of an object b. Distinguish between examples of kinetic and potential energy (gravitational, elastic, chemical) within a system c. Identify the advantages and disadvantages of using series and parallel electrical circuits to do work
ST	SC 1 1.6, 2.1			SC 1 1.2, 1.4, 1.6
B. Energy from the sun (solar radiation) is a major source of energy		<i>Scope & Sequence – Water Cycle and Weather (SC 5)</i> a. Identify solar radiation as the source of energy for weather phenomena	<i>Scope & Sequence – Ecology: Populations</i> a. Recognize that the Sun is the source of almost all energy used to produce the food for living organisms	<i>Scope & Sequence – Structure and Function of Life</i> a. Explain that energy is needed by all cells to carry on cell processes and must be captured by cells through photosynthesis or ingested as food
ST		SC 1 1.5, 1.6, 1.8		

Standard 1: Properties and Principles of Matter and Energy (*continued*)

2. Forms and Sources of Energy (<i>continued</i>)				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
C. Energy can change from one form to another within systems but the total amount remains the same	<i>Scope & Sequence – Forms of Energy: Electricity</i> a. Identify transformations of energy within electrical circuits (heat, light, sound, motion, and magnetic effects)	<i>Scope & Sequence – Forms of Energy: Heat</i> a. Identify ways that friction produces heat (e.g. rubbing hands, rubbing sandpaper, rug burns, machine parts rubbing together)		<i>Scope and Sequence – Energy Transfer and Transformations</i> a. Describe the energy transformations as mechanical energy changes form from kinetic to potential within a system (e.g., girl swinging, diver jumping off of a board) b. Identify the means of energy transfer and the different forms that exist as energy transformations occur through different systems (e.g., chemical energy in battery converted to electricity in circuit converted to light and heat from bulb) c. Recognize that heat is produced during any energy transfer d. Recognize that energy is conserved as it is transferred and transformed

Standard 2: Properties and Principles of Force and Motion

1. Relative Motion				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. The motion of an object can be described as a change in position, direction and speed	<i>Scope & Sequence – Exploring Motion</i> a. Describe an object’s motion in terms of distance over time			<i>Scope and Sequence – Force, Motion, and Work</i> a. Given an object in motion, calculate its speed (distance/time) b. Graph and interpret a line graph representing an object’s motion in terms of distance vs. time (speed)
ST	SC 2 1.8			SC 2 1.8
2. Interactions of Force and Motion				
A. A relationship exists between the strength of a force and its effect on the motion of an object	<i>Scope & Sequence – Exploring Motion</i> a. Explain how increasing or decreasing the force on an object affects the motion of that object b. Explain how the mass of an object affects the force required to move it			
ST	SC 2 1.2			
B. Balanced and unbalanced forces affect the motion of an object	<i>Scope & Sequence – Exploring Motion</i> a. Describe the effects of balanced and unbalanced forces on an object’s motion b. Discuss how speed is affected by the amount of force or the mass of the object (faster/slower) c. Describe how an unbalanced force acting on an object changes its speed (faster, slower), direction of motion or both	<i>Scope & Sequence – Buoyancy</i> c. Predict whether various objects will float or sink d. Identify the variables (material, size, shape, different masses, volume, type of fluid) that will affect buoyancy e. Identify buoyancy as the force of a fluid that exerts an equal but opposite force on a floating object		<i>Scope & Sequence – Force, Motion, and Work</i> a. Compare the effects of balanced and unbalanced forces (including magnetic, gravity, friction, push or pull) on an object’s motion b. Explain that when forces (including magnetic, gravity, friction, push or pull) are balanced, objects are at rest or their motion remains constant c. Explain that a change in motion is the result of an unbalanced force acting upon an object d. Explain how the speed of a moving object is affected by the amount of force applied and the mass of the object
ST				SC 2 1.6
C. There are different kinds of forces (magnetic, gravitational, frictional, mechanical) that affect motion	<i>Scope & Sequence – Exploring Motion</i> a. Describe Earth’s gravity as a force that pulls objects on or near the Earth toward the Earth without touching it b. Measure in Newtons and compare the force (stronger/weaker) required to overcome friction and move an object over different surfaces using a spring scale c. Compare the effect of different materials and how they increase or decrease friction	<i>Scope & Sequence – Simple Machines</i> a. Describe how friction affects the amount of force needed to do work <i>Scope & Sequence – Buoyancy</i> b. Determine the gravitational pull of the Earth on an object (weight) using a spring scale		<i>Scope & Sequence – Force, Motion, and Work</i> a. Compare the forces acting on an object using a spring scale to measure them to the nearest Newton
ST	SC 2 1.1			

Standard 2: Properties and Principles of Force and Motion *(continued)*

Concept	Grade 4	Grade 5	Grade 6	Grade 7
2. Interactions of Force and Motion <i>(continued)</i>				
D. Simple machines (levers, inclined planes, wheel and axle, and pulleys) can be used to affect the force applied to an object and/or direction of movement		<i>Scope & Sequence – Simple Machines</i> a. Explain how work can be done on an object (force applied and distance moved) (No formula calculations at this level) b. Explain how simple machines change the amount of force, direction of force, or time required to do work c. Identify the simple machines in common tools and household items d. Evaluate simple machine designs to determine which design makes work easier and explain why		<i>Scope & Sequence – Force, Motion, and Work</i> a. Recognize examples of work being done with and without the use of simple machines b. Calculate the amount of work done when a force is applied to an object over a distance ($W = F \times d$)
ST		SC 2 1.1, 1.2, 1.6		SC 2 1.2, 1.6

Standard 3: Characteristics and Interactions of Living Organisms

1. Characteristics of Organisms				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Organisms can be classified into groups based on similar characteristics		<i>Scope & Sequence – Structure and Classification of Life</i> a. Distinguish between plants, which use sunlight to make their own food, and animals, which must consume energy-rich food b. Explain how the anatomical similarities of each class are the basis for classification c. Identify plants or animals using a simple dichotomous key d. Classify animals as vertebrates and invertebrates e. Classify animals into classes (fish, amphibians, reptiles, birds, and mammals) f. Differentiate among the Bacteria, Protist, Fungi, Plant, and Animal kingdoms using the characteristics of organisms (These will be the kingdoms used for assessment)		
ST		SC 3 1.5, 1.6, 3.1, 3.6		
B. Organisms may have beneficial and/or detrimental impact on other organisms				<i>Scope & Sequence – Structure and Function of Life</i> a. Explain the beneficial or detrimental impact that some organisms (viruses, bacteria, fungi and parasites) may have on other organisms and/or their environment (e.g. diseases, vaccines, breakdown of waste, antibiotics, fermentation)
ST				SC 3 1.6, 3.1, 3.6
C. Some diseases are the result of the breakdown in structures or functions of one or more body systems or at the cellular level				<i>Scope & Sequence – Structure and Function of Life</i> a. Explain the cause and effect of diseases on the human body (i.e., AIDS, cancer, diabetes and hypertension)
ST				SC 3 3.1

Standard 3: Characteristics and Interactions of Living Organisms *(continued)*

2. Structure and Function of Living Systems				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. All living things are made of cell(s) that carry out life processes.		<i>Scope & Sequence – Structure and Classification of Life</i> a. Describe the common characteristics of living organisms (i.e., grow, reproduce, have a life span, respond to stimuli, require energy, exchange gases, need water, eliminate waste) b. Recognize that some organisms are unicellular and some organisms are multicellular c. Compare and contrast the structures of plant and animal cells (i.e., cell membrane, nucleus, cell wall, chloroplast, cytoplasm)		<i>Scope & Sequence – Structure and Function of Life</i> a. Identify structures (nucleus, cell membrane, cell wall, chloroplasts, mitochondria, vacuoles, chromosomes, cytoplasm) within plant and animal cells b. Explain the function of the cell structures (nucleus, cell membrane, cell wall, chloroplasts, chromosomes, mitochondria, vacuoles, cytoplasm) (Be very general in descriptions)
ST				

B. Multicellular organisms are interacting systems of cells, tissues, organs and organ systems that carry out life processes		<i>Scope & Sequence – Structure and Classification of Life</i> a. Identify the major organs (roots, stems, and leaves) of a vascular plant's root and shoot systems		<i>Scope & Sequence – Structure and Function of Life</i> a. Identify and give examples of each level of organization (cell, tissue, organ, organ system) in multicellular organisms (plants, humans, and other animals)
ST				

Standard 3: Characteristics and Interactions of Living Organisms *(continued)*

2. Structure and Function of Living Systems				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means		<i>Scope & Sequence – Structure and Classification of Life</i> a. Describe how major plant organs function together to capture light energy, produce food and oxygen through photosynthesis, and transport water, nutrients, and waste products b. Illustrate and explain the path water and nutrients take as they move through the transport system of a plant		<i>Scope & Sequence – Structure and Function of Life</i> a. Explain the interactions between the circulatory and digestive systems as nutrients are processed by the digestive system, passed into the blood stream and are transported in and out of the cell b. Identify the importance of the transport and exchange of nutrient and waste molecules to the survival of an organism c. Identify and explain the role of the digestive action involved with mechanical and chemical digestion d. Explain the interactions between the circulatory and respiratory systems when oxygen enters the body, passes into the blood stream, and is transported into the cell e. Describe the importance of the transport and exchange of oxygen and carbon dioxide to the survival of the organism f. Explain the interactions between the nervous and muscular systems when an organism responds to a stimulus
ST				SC 3 3.1
D. Cellular activities and responses can maintain stability internally while external conditions are changing				<i>Scope & Sequence – Structure and Function of Life</i> a. Predict the response the body may take to maintain internal balance during an environmental change (e.g., shivering when cold, metabolism slows when food supply decreases, adrenalin rush when frightened)
ST				SC 3 3.5

Standard 3: Characteristics and Interactions of Living Organisms *(continued)*

3. Reproduction and Heredity				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Reproduction is a characteristic of all living systems and is essential to the continuation of every species				<i>Scope & Sequence – Structure and Function of Life</i> a. Explain why cells need to grow and divide. b. Explain the importance of reproduction to the survival of a species
ST				SC 3 1.1, 3.5
B. Reproduction can occur asexually or sexually				<i>Scope & Sequence – Structure and Function of Life</i> a. Compare and contrast the processes of asexual and sexual reproduction, including: the type and number of cells involved; the number of genes passed from parent(s) to offspring, and the similarities and differences between the traits of the parent(s) and offspring b. Identify examples of asexual reproduction (i.e., plants budding, binary fission of single cell organisms) c. Explain how flowering plants reproduce sexually
ST				SC 3 3.1
C. Chromosomes carry the genetic information that determines heredity				<i>Scope & Sequence – Structure and Function of Life</i> a. Identify chromosomes as the component of cells that occur in pairs and carry hereditary information in units called genes b. Recognize that the same genetic information is copied in each new cell of an organism (Assess only the concept not the term or process of mitosis) c. Recognize that when sexual reproduction occurs, the new organism contains a combination of the genetic material from both parents (Assess only the concept not the term or process of meiosis)
ST				
4. Change Over Time				
	Not tested at this grade level			

Standard 4: Changes in Ecosystems and Interactions of Organisms with Their Environments

1. Populations and Ecosystems				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
<p>A.</p> <p>All populations living together and the physical factors with which they interact compose an ecosystem</p>	<p><i>Scope & Sequence - Ecosystems</i></p> <p>a. Categorize populations of organisms as producers, consumers or decomposers by the role they serve in the ecosystem</p>	<p><i>Scope & Sequence – Water Cycle and Weather (SC 5)</i></p> <p>a. Provide examples of how humans and other living organisms depend on the water cycle</p>	<p><i>Scope & Sequence – Ecology: Populations</i></p> <p>a. Identify populations within a community that are in competition with one another for resources</p> <p>b. Predict how populations within an ecosystem change in number and/or structure in response to possible changes in biotic and/or abiotic factors</p>	
ST	SC 4 1.6		SC 4 3.1	
<p>B.</p> <p>As energy flows through the ecosystem, all organisms must capture the portion of energy available to them and transform it to a usable form</p>	<p><i>Scope & Sequence - Ecosystems</i></p> <p>a. Identify light as the source of energy that plants use to produce their own food</p> <p>b. Differentiate between the three types of consumers (herbivore, carnivore and omnivore)</p> <p>c. Describe the flow of energy through a food chain</p> <p>d. Predict the possible effects of removing an organism from a food chain</p>		<p><i>Scope & Sequence – Ecology: Populations</i></p> <p>a. Diagram and describe the transfer of energy in an aquatic food web and in a land food web with reference to producers, consumers, decomposers, scavengers and predator/prey relationships</p>	
ST	SC 4 4.1		SC 4 2.1, 1.1	
<p>C.</p> <p>Matter is recycled in an ecosystem</p>			<p><i>Scope & Sequence – Ecology: Populations</i></p> <p>a. Illustrate the recycling of matter in the water and oxygen/carbon cycles</p> <p>b. Explain that the amount of matter remains constant while being recycled through the water and oxygen/carbon cycles and through food webs</p>	
ST			SC 4 1.1	
<p>D.</p> <p>All organisms, including humans and their activities, cause changes in their environments that can be either beneficial or harmful to the organisms in the ecosystem</p>	<p><i>Scope & Sequence - Ecosystems</i></p> <p>a. Predict the helpful and harmful effects of an environmental change (e.g., drought, flooding, restoration of a natural environment) on a specific organism</p>	<p><i>Scope & Sequence – Water Cycle and Weather (SC 5)</i></p> <p>a. Describe how humans and other organisms affect the hydrosphere (e.g., water pollution, overuse)</p>	<p><i>Scope & Sequence – Ecology: Populations</i></p> <p>b. Describe beneficial and harmful activities of organisms, including humans, and explain how they affect an ecosystem (e.g., deforestation, overpopulation, water and air pollution, restoration of natural environment, reintroduction of predators, depletion of resources)</p>	
ST	SC 4 3.6		SC 4 3.6	

Standard 4: Changes in Ecosystems and Interactions of Organisms with Their Environments *(continued)*

2. Diversity and Adaptation				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. An organism’s structures and/or behaviors are uniquely adapted to enhance the ability of the organism to survive.			<i>Scope & Sequence – Ecology: Populations</i> a. Predict how certain traits (e.g., structure of teeth, body structure, coloration) are more likely to offer an advantage for survival of an organism b. Relate the structure of organs to an organism’s ability to survive in a specific environment (e.g., hollow bones allow for flight, hollow hair insulates from hot or cold, dense root structure allows plants to grow in compact soil, fins aid in movement through water) c. Recognize that fossils provide evidence of the diversity and possible extinction of many life forms	
ST				

Standard 5: Process and Interactions of the Earth’s Systems

1. Geosphere				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. The Earth’s crust is composed of various materials including soils, rocks and minerals	<i>Scope & Sequence – Earth Materials and External Processes</i> a. Distinguish between minerals (a pure substance made up of one kind of atom or a combination of atoms) and rocks (a combination of minerals) b. Observe and describe different types of rocks according to properties (i.e., color, texture, layering, presence of fossils) c. Observe and describe different kinds of soils according to properties		<i>Scope & Sequence – Earth Materials and Internal Processes</i> a. Identify and classify samples of earth materials into minerals (naturally occurring crystalline compounds) or rocks (mixtures of minerals) b. Use classification keys to identify minerals by their observable properties (texture, smell, luster, hardness, crystal shape, streak and reaction to magnets)	
ST	SC 5 1.2			
B. The Earth’s materials are formed through a variety of processes			<i>Scope & Sequence – Earth Materials and Internal Processes</i> a. Make inferences about the formation of rocks by their physical properties (e.g., layering and fossils indicate sedimentation, crystals indicate heat and pressure, air pockets or glassy texture indicate volcanic activity)	
ST	SC 5		SC 5	

Standard 5: Process and Interactions of the Earth’s Systems *(continued)*

1. Geosphere <i>(continued)</i>				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
C. The Earth’s surface is constantly changing due to naturally occurring processes and human interactions with the Earth and this can be supported with evidence (rock layers, fossils, shape)	<i>Scope & Sequence – Earth Materials and External Processes</i> a. Describe evidence that waves, wind, water and ice shape and reshape the Earth’s surface by eroding and weathering rock and soil b. Identify causes of surface changes on Earth (i.e., weathering by water, wind, glaciation and plants) c. Identify land forms on the Earth’s surface (e.g., coastlines, rivers, mountains, deltas, and canyons) and the weathering or erosion process that formed them d. Predict the effects of the variables (type and amount of erosion/weathering force, time, type and mass of surface material, slope) that influence erosion and deposition of Earth’s surface materials e. Explain how water, wind, glaciers, and plants apply forces to the Earth’s surface and cause Earth materials to move f. Analyze the ways humans affect erosion and deposition through the clearing of land, planting vegetation and building dams		<i>Scope & Sequence – Earth Materials and Internal Processes</i> a. Use fossil evidence to make inferences about changes on Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of extinct organisms) b. Describe the changes in the Earth’s surface that occur at different plate boundaries and identify the landforms that result from earthquakes and volcanic eruptions	
ST			SC 5 1.4, 1.6	
D. There are internal processes that change the surface of the Earth			<i>Scope & Sequence – Earth Materials and Internal Processes</i> a. Explain the processes involved in the heating and convection of molten materials within the mantle layer	
ST		SC 5 3.1		

Standard 5: Process and Interactions of the Earth’s Systems (*continued*)

1. Geosphere (<i>continued</i>)				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
E. The geosphere consists of specific zones that each have unique distinguishable characteristics			<i>Scope & Sequence – Earth Materials and Internal Processes</i> a. Recognize and describe the properties of Earth's layers (crust, mantle, inner and outer core) b. Identify the source of the energy involved in the melting of rock materials, convection of magma, and eruption/flow of lava	
ST			SC 5 1.3, 1.5, 1.6	

Standard 5: Process and Interactions of the Earth’s Systems *(continued)*

2. Atmosphere and Weather				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. The atmosphere is composed of a chemical mixture of gases, water vapor, and minute particles		<i>Scope & Sequence – Water Cycle and Weather</i> a. Recognize that the atmosphere is composed of a mixture of gases, water, dust, and other minute particles b. Describe how the components of the atmosphere affect the environment (e.g., weather, air quality)		<i>Scope & Sequence – Weather</i> a. Describe characteristics of the Earth’s atmosphere (chemical composition, variation in temperature, variation in pressure)
ST		SC 5 1.4, 3.5		
B. Properties of weather such as cloud cover, precipitation, wind speed and direction, and temperature can be observed and measured		<i>Scope & Sequence – Water Cycle and Weather</i> a. Analyze patterns identified in weather data by using a variety of instruments (i.e., satellites, Doppler radar maps, barometers, thermometers, rain gauges, anemometers, wind vanes, hygrometers) to explain present weather conditions		<i>Scope & Sequence – Weather</i> a. Identify and use appropriate tools (thermometer, anemometer, wind vane, hygrometer, barometer, rain gauge, satellite images, Doppler radar maps) to collect weather data (temperature, wind speed and direction, relative humidity, air pressure, precipitation, cloud type and cover) b. Use weather data from weather instruments and maps to make reasonable predictions about the next day’s weather c. Describe the relationship between air temperature and air pressure d. Recognize the characteristics of air masses and predict their effect on the weather in a given location e. Recognize the effects of location (proximity to large bodies of water, surface type, elevation, latitude) on the weather
ST		SC 5 1.4, 3.5		
C. Dramatic changes in the pressure, temperature and wind create powerful forces that can affect our planet and living thing that inhabit it		Can I understand thinking I can’t explain weather		<i>Scope & Sequence – Weather</i> a. Describe the impact of tornadoes, hurricanes and storms on Earth
ST				SC 5 1.4, 3.5

Standard 5: Process and Interactions of the Earth’s Systems *(continued)*

3. Hydrosphere: Water – Water Cycle				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
<p>A.</p> <p>The ability of water to change forms as it moves through a system is called the water cycle</p>		<p><i>Scope & Sequence – Water Cycle and Weather</i></p> <p>a. Explain and trace the path of water through the environment (including surface, groundwater, and atmosphere) known as the water cycle</p> <p>b. Identify the different forms water can take ((i.e., snow, rain, sleet, fog, clouds, dew) as it moves through the water cycle</p>		
ST		SC 5 1.3, 1.6, 3.4		
<p>B.</p> <p>The water cycle occurs because of heating and cooling, and involves the processes of convection, conduction, and radiation</p>		<p><i>Scope & Sequence – Water Cycle and Weather</i></p> <p>a. Explain how thermal energy is transferred throughout the water cycle by the processes of convection, conduction, and radiation</p>		
ST		SC 5 1.6, 2.1		

Standard 6: Composition and Structure of the Universe and the Motion of the Objects Within It

1. Composition and Structure of the Universe				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. The Earth is the third planet from the Sun in a system that includes the Moon, the Sun, eight other planet and their moons, and smaller celestial bodies			<i>Scope & Sequence – Earth and Space</i> a. Classify celestial bodies in the solar system (Sun, Moon, planets, other smaller bodies) into categories based on the physical properties they have in common b. Compare and contrast the size, composition and surface of the nine planets in our solar system c. Explain the characteristics of Earth that support life (e.g., oxygen, water, atmosphere, soil) d. Identify the relative proximity of common celestial bodies in the sky to the Earth (sun, moon, planets, smaller celestial bodies, other stars)	
ST			SC 6 1.2	
B. The Sun, an average star, is the central and largest body in Earth’s solar system			<i>Scope & Sequence – Earth and Space</i> a. Compare how much closer the Sun is to the Earth than any other star	

Standard 6: Composition and Structure of the Universe and the Motion of the Objects Within It *(continued)*

2. Motions of the Universe				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Gravity is the force that holds objects to the earth's surface, keeps planets in orbit around the sun, and governs the rest of the motion of the solar system.			<i>Scope & Sequence – Earth and Space</i> a. Explain the orbital motions of moons around planets and planets around the Sun as the result of gravitational forces between those objects	
ST			SC 6 1.8, 3.1	
B. Time (day, month and year) can be measured by observing the regular and predictable motions of the Sun and Moon			<i>Scope & Sequence – Earth and Space</i> a. Sequence images of the lit portion of the moon as seen from Earth as it cycles from day-to-day in about a month in order of occurrence and name the phases observed (Do NOT assess cause of Moon phases) b. Illustrate how the Earth revolves around the Sun c. Illustrate and explain a year as the time it takes a planet to revolve around the Sun d. Illustrate and explain a day as the time it takes a planet to make a full rotation on its axis e. Compare the length of day, year, size, and position in the solar system of Earth to those of the other planets in our solar system f. Relate the Earth's tilted position on its axis and its position in its orbit to the apparent change in the Sun's appearance throughout the year (i.e., higher in the sky in warmer months, lower in colder months) and to the change in the amount of solar radiation received at a given point on Earth (i.e., greater in the warmer months, less in the colder months)	
ST			SC 6 1.8, 3.1	
C. The Sun, Moon, stars and planets appear to move from east to west each day			<i>Scope & Sequence – Earth and Space</i> a. Observe and describe how the Sun, Moon, stars and planets change position in the sky as they appear to move east to west over the course of a day due to Earth's rotation	
ST			SC 6 1.6	

Standard 7: Processes of Scientific Inquiry

1. Scientific Inquiry				
Concept	Grade 4	Grade 5	Grade 6	Grade 7
A. Scientific inquiry includes the ability of students to develop and test scientifically oriented questions	a. Formulate testable questions b. Conduct a fair test to answer a question c. Recognize the characteristics of a fair and unbiased test	a. Formulate testable questions b. Conduct a fair test to answer a question c. Recognize the characteristics of a fair and unbiased test	a. Formulate testable questions b. Design and conduct (with guidance) a valid experiment including manipulation of only one variable and multiple trials c. Evaluate the design of an experiment	a. Formulate testable questions b. Design and conduct a valid experiment including manipulation of only one variable and multiple trials c. Evaluate the design of an experiment
ST	SC 7 1.1, 1.2	SC 7 1.1, 1.2	SC 7 1.1, 1.2	SC 7 1.1, 1.2
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	a. Observe using simple tools and equipment (e.g., hand lenses, magnets, balances, graduated cylinder, thermometer) b. Measure length to the nearest centimeter c. Measure mass to the nearest gram d. Measure temperature to the nearest degree Celsius	a. Use a variety of tools and equipment to gather data (e.g., hand lenses, magnets, balances, graduated cylinder, thermometer) b. Measure length to the nearest centimeter c. Measure mass to the nearest gram d. Measure volume to the nearest milliliter e. Measure temperature to the nearest degree Celsius f. Determine the appropriate tools and techniques to collect data	a. Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, computers, spring scales, balances, magnets, voltmeter, and graduated cylinders) b. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force (weight) to the nearest Newton c. Determine the appropriate tools and techniques to collect data	a. Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, and graduated cylinders) b. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius c. Determine the appropriate tools and techniques to collect, analyze, and interpret data d. Find the mean, median, and mode for sets of data
ST	SC 7 1.4, 1.8	SC 7 1.4, 1.8	SC 7 1.4, 1.8	SC 7 1.4, 1.8
C. Scientific inquiry includes evaluation of explanations in light of scientific principles (understandings)	a. Evaluate the reasonableness of an explanation b. Make predictions supported by scientific knowledge c. Analyze whether evidence supports proposed explanations d. Recognize that explanations have changed over time as a result of new evidence	a. Evaluate the reasonableness of an explanation b. Make predictions supported by scientific knowledge c. Analyze whether evidence supports proposed explanations d. Recognize that explanations have changed over time as a result of new evidence	a. Evaluate the reasonableness of an explanation b. Make predictions (hypotheses) supported by scientific knowledge c. Analyze whether evidence supports proposed explanations d. Recognize that explanations have changed over time as a result of new evidence	a. Evaluate the reasonableness of an explanation b. Make predictions (hypotheses) supported by scientific knowledge c. Analyze whether evidence supports proposed explanations (hypotheses, theories, laws) d. Recognize that explanations have changed over time as a result of new evidence
ST	SC 7 1.6, 3.5, 4.1	SC 7 1.6, 3.5, 4.1	SC 7 1.6, 3.5, 4.1	SC 7 1.6, 3.5, 4.1
D. The nature of science relies upon communication of results and justification of explanations	a. Communicate the procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs ⇒ writings b. Interpret data in order to make and support conclusions	a. Communicate the procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs ⇒ writings b. Interpret data in order to make and support conclusions	a. Communicate the procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs ⇒ writings b. Interpret data in order to make and support conclusions	a. Communicate the procedures and results of investigations and explanations through: ⇒ verbal explanations ⇒ drawings ⇒ data tables ⇒ graphs ⇒ writings b. Interpret data in order to make and support conclusions
ST	SC 7 1.8, 2.1	SC 7 1.8, 2.1	SC 7 1.8, 2.1	SC 7 1.8, 2.1

Refer to DESE materials that articulate standards for data recording and template for experimental design

Standard 8: Impact of Science, Technology and Human Activity

1. The Nature of Technology	
Concept	Grades 4, 5, 6, 7
A. Advances in technology often result in improved data collection and an increase in scientific information	a. Identify the link between improvement in tools and discoveries in science (e.g., the telescope and planetary moons, the electron microscope and cell organelles, sonar and the composition of the earth, satellites and robotics and space exploration, Doppler radar and weather conditions, MRI and CAT-scans and brain activity)
ST	
B. Technological solutions to problems often have drawbacks as well as benefits	a. Describe how technological solutions to problems can have both benefits and drawbacks (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics)
ST	
2. Historical Perspective	
A. People from various cultures, races, and of different gender have contributed to scientific discoveries and the invention of technological innovations	a. Investigate the contributions of scientists and inventors (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Charles Darwin, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell)
ST	
3. Science as a Human Endeavor	
A. Science and technology are used to solve problems. Technological innovations have played an important role in improving the quality of human life.	a. Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS) b. Explain how technological improvements such as those developed for use in space exploration or by the military have led to the invention of new products that may improve our lives here on Earth (e.g., materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics)
ST	

Scope and Sequence

Topic/Standard	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Physical Science <u>Matter & Energy</u> Standard 1	Describing with the Five Senses Sounds	Balancing and Measuring	Matter and Energy	Forms of Energy: Sound	Observing Properties of Matter Forms of Energy: Electricity	Forms of Energy: Heat	Properties and Changes of Matter Forms of Energy: Light	Energy Transfer and Transformations		Properties and Principles of Matter and Energy	
Physical Science <u>Force & Motion</u> Standard 2	Relative Position Magnets	Describing Motion	Investigating Forces		Exploring Motion	Buoyancy Simple Machines		Force, Motion, and Work		Properties and Principles of Force and Motion	
Life Science <u>Living Systems</u> Standard 3	Plant and Animal Behaviors	Plant and Animal Characteristics	Life Cycles of Plants and Animals			Structure and Classification of Life		Structure and Function of Life			Characteristics and Interactions of Organisms
Life Science <u>Ecology</u> Standard 4				Interactions and Interdependence of Organisms	Ecosystems		Ecology: Populations				Changes in Ecosystems and Interactions of Organisms with Their Environment
Earth Science <u>Earth Systems</u> Standard 5		Observing Weather/Heat	Earth Materials: Rocks & Soil	Properties of Water and the Water Cycle	Earth Materials and External Processes	Water Cycle and Weather	Earth Materials and Internal Processes	Weather	Process and Interactions of the Earth's Systems		
Earth Science <u>Universe</u> Standard 6	Observing the Changes in Seasons			Observing Patterns of the Sun, Moon, and Shadows			Earth and Space		Composition and Structure of the Universe and the Motion of the Objects Within It		

Inquiry Standard 7	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry
Impact of Science, Technology and Human Activity Standard 8	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity	Impact of Science, Technology and Human Activity